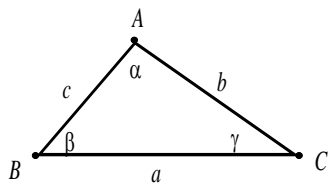


**The Law of Cosines**

$$a^2 = b^2 + c^2 - 2bc \cos \alpha$$

**The Law of Cosines:** In any triangle,  $b^2 = a^2 + c^2 - 2ac \cos \beta$

$$c^2 = a^2 + b^2 - 2ab \cos \gamma$$

**SSS:** Use the fact that the largest angle is across from the longest side of the triangle to solve for the largest angle using the law of cosines. (For example, if  $c$  is the longest side, use the equation  $c^2 = a^2 + b^2 - 2ab \cos \gamma$  to solve for  $\gamma$ .) Then use the law of sines to find the remaining angles, which will both be acute.

**Example:**  $a = 3.8$ ,  $b = 9.6$ ,  $c = 7.7$

**SAS:** Find the length of the third side using the law of cosines. Use the law of sines to find the angle across from the shorter of the two given sides. Find the remaining angle by subtracting the first two from  $180^\circ$ .

**Example:**  $b = 5.8$ ,  $c = 3.6$ ,  $\alpha = 39.5^\circ$

**Example:** Jan and Dean started hiking from the same location at the same time. Jan hiked at 4 mph with bearing N12°E, and Dean hiked at 5 mph with bearing N31°W. How far apart were they after 6 hours? Round to the nearest tenth of a mile.

**Length of a Chord:** If a chord of length  $a$  is intercepted by a central angle  $\alpha$  in a circle of radius  $r$ , then  $a = r\sqrt{2 - 2\cos\alpha}$ . (This formula is derived from the law of cosines.)

**Example:** Find the length of the chord intercepted by a central angle of  $33.8^\circ$  in a circle of radius 22.4 ft.

